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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,208	03/16/2004	Kwang-hee Lee	5649-1277	2034

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EXAMINER	
TRAN, THANH Y	

ART UNIT	PAPER NUMBER
2892	

MAIL DATE	DELIVERY MODE
10/16/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/801,208	LEE ET AL.	
	Examiner	Art Unit	
	THANH Y. TRAN	2892	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-12,14,34-45 and 47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4-8,12,14,34-45 and 47* is/are allowed.

6)☒ Claim(s) *2-3 and 9-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 2-3 are rejected under 35 U.S.C. 102(e) as being anticipated by Iizuka et al (U.S. 2002/0190294).

As to claim 2, Iizuka et al discloses in figures 9I-9N a method of fabricating a capacitor, the comprising: forming a lower electrode (34) on a substrate (21); forming a dielectric layer (35) on the lower electrode (34); and forming an upper electrode (36a) on the dielectric layer (35) to provide a capacitor that comprises the lower electrode (34), the dielectric laver (35) and the upper electrode (36a); wherein forming the lower electrode (34) on the substrate (21) comprises at least forming a ruthenium seed layer (seed layer 34 is made of Ru) using atomic laver deposition ("ALD")) on the substrate (21) (see paragraphs [0133] & [0051]) and forming a main ruthenium layer (layer 36a is made of Ru) on the ruthenium seed layer using chemical vapor deposition ("CVD") (see paragraphs [0111] & [0058]).

As to claim 3, Iizuka et al discloses in figures 9I-9N a method further comprising: forming a storage node contact plug ("capacitor contact" 31) on the semiconductor substrate (21) and a storage node ("cell contact" 28) that is electrically connected to the storage node contact

plug ("capacitor contact" 31) to provide a semiconductor memory device, wherein the ruthenium seed layer (34) is formed on the storage node contact plug ("capacitor contact" 31).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iizuka et al (U.S. 2002/0190294).

As to claim 9, Iizuka et al does not disclose the ruthenium seed layer having a thickness of about 5 A to 50 A, and the main ruthenium layer having a thickness of 50 A to 300 A. However, the thickness range for a layer would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore,

the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

As to claim 10, Iizuka et al does not disclose supplying oxygen at a flow rate of about 1 sccm to 50 sccm for forming of the main ruthenium layer; and supplying a ruthenium source at a flow rate of about 0.1 ccm to 2 ccm under a pressure of about 0.4 Torr to 0.6 Torr. However, a flow rate of supplying oxygen of about 1 sccm to 50 sccm, or a flow rate of a ruthenium source about 0.1 ccm to 2 ccm under a pressure of about 0.4 Torr to 0.6 Torr would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore, the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

As to claim 11, Iizuka et al does not disclose the dielectric layer comprises a tantalum oxide layer. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Iizuka et al by using a tantalum oxide material for a dielectric layer for providing a suitable high-k material for the dielectric layer,

since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended used and because such material substitution or replacement would have been considered a mere substitution of art-recognized equivalent values, MPEP 2144.06.

Allowable Subject Matter

5. Claims 4-8, 12, 14, 34-45 and 47 are allowed.

6. The following is an examiner's statement of reasons for allowance:

The prior art of record and to the examiner's knowledge does not teach or render obvious, at least to the skilled artisan, the instant invention regarding a method of fabricating an electrode for a microelectronic device, particularly characterized by forming a main Ru layer on the Ru seed layer formed by using atomic layer deposition; patterning the main Ru layer and the Ru seed layer to form the electrode; and injecting oxygen containing gas and hydrogen-containing gas into the chamber for forming the Ru seed layer using atomic layer deposition, as defined in claims 4 and 35. Claims 5-8, 14, 34-45 and 47 are dependent upon independent claims 4 and 35.

The prior art of record and to the examiner's knowledge does not teach or render obvious, at least to the skilled artisan, the instant invention regarding a method of fabricating an electrode for a microelectronic device, particularly characterized by forming a main ruthenium layer using chemical vapor deposition on a ruthenium seed layer using atomic layer deposition; forming a second ruthenium seed layer using atomic layer deposition on the dielectric layer; and forming a second main ruthenium layer on the second ruthenium seed layer, as defined in independent claim 12.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

7. Applicant's arguments filed 07/14/2008 have been fully considered but they are not persuasive.

Applicant stated that the rejection(s) have been overcome by applicant amendment(s) to claim 2.

In response, the examiner disagrees with applicant's argument(s) because the amended claim 2 does not include the allowable subject matters, as recited in the original claim 12, to overcome the applied art of Iizuka et al. Since figures 9I-9N of Iizuka et al clearly disclose the same structure as in the amended claimed invention, applicant's argument(s) have been considered but they are not persuasive.

Applicant further argued that the dielectric layer is not between the electrodes, and thus will not provide a capacitor.

In response, the examiner disagrees with applicant's argument because figures 9I-9N of Iizuka et al clearly disclose the dielectric layer (35) is between the electrodes (34, 36a) (see the amended claim 2 above) and thus it provides a capacitor. In claim 2, applicant recites that a capacitor comprises the lower electrode, the dielectric layer and the upper electrode, and figures 9I-9N of Iizuka et al clearly disclose the same structure as in the claimed invention (a capacitor

comprises the lower electrode (34), the dielectric laver (35) and the upper electrode (36a), as shown in figures 9I-9N of Iizuka et al).

Applicant further argued that layers 34 and 36a of Iizuka et al are separated by dielectric layer 35 and clearly do not act as "an electrode".

In response, the examiner disagrees with applicant's argument because layers 34 and 36a are themselves "electrodes"/(lower and upper electrode, see paragraph [0110] in Iizuka et al), and thus they inherently act as "electrodes".

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Y. Tran whose telephone number is (571) 272-2110. The examiner can normally be reached on M-F (9-6:30pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao X. Le, can be reached on (571) 272-1708. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/T. Y. T./

Examiner, Art Unit 2892

/Phuc T Dang/

Primary Examiner, Art Unit 2892